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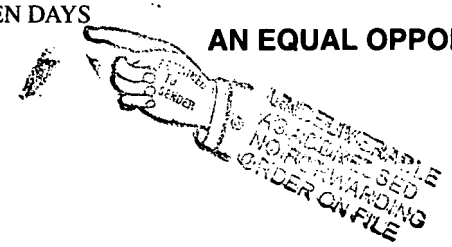

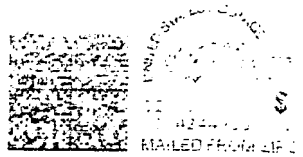

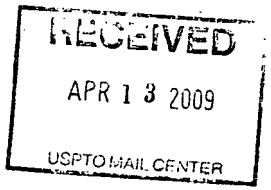

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/839,451	04/20/2001	David Corts	4232-4002	4838

7590 03/27/2009

MORGAN & FINNEGAN, L.L.P.
345 Park Avenue
New York, NY 10154-0053

EXAMINER
CHAMPAGNE, DONALD

ART UNIT	PAPER NUMBER
3688	

MAIL DATE	DELIVERY MODE
03/27/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	09/839,451	CORTS ET AL.	
	Examiner	Art Unit	
	Donald L. Champagne	3688	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 November 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *213-228* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *213-228* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 221-228 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

   (A) At the last two lines of claim 221, "a digital information waveform encapsulated in a series of RF sub-carriers" is new matter.

   (B) At line 2 in each independent claim 213 and 221, "identifying when broadcast data need to be transmitted" is new matter.

3. Claims 221-228 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. At line 2 in each independent claim 213 and 221, "identifying when broadcast data need to be transmitted" is not enabled. It is not disclosed how said "need" is determined.

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 213-228 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. At line 2 in each independent claim 213 and 221, "identifying when broadcast data need to be transmitted" is indefinite. It is not disclosed how said "need" is determined.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 213-220 are rejected under 35 U.S.C. 103(a) as being unpatentable over Abecassis (US006192340B1) in view of Schumacher, Jr., et al. (US005615227A).

8. Abecassis teaches (independent claim 213) a method comprising:

receiving from at least one of multiple broadcasters (*a plurality of providers **411-413***, providing service by *radio **404***, col. 11 lines 1-19 and Fig. 4) broadcast schedule information (*Providing a broadcast schedule*, col. 16 lines 40-46) identifying when broadcast data is to be transmitted over specific broadcast channels at predetermined times (a "broadcast schedule" inherently identifies "broadcast information to be transmitted over specific channels at predetermined times") from the at least one of multiple broadcasters to an end user (*a plurality of providers **411-413***, providing service by *radio **404***, col. 11 lines 1-19 and Fig. 4);

analyzing the received broadcast schedule information (applying the *schedule/ scheduling*, *music* and *information preferences*, col. 17 lines 37-42 and col. 20 lines 23-52) and, based upon the analysis, identifying supplemental digital data (*information **755***, col. 20 lines 59-61 and Fig. 7) to be provided to a broadcaster from among the at least one of the multiple broadcasters, the supplemental digital data being correlated (*coordinated*, col. 21 lies 63-67) to broadcast data such that both can concurrently be provided by the broadcaster; and

providing the supplemental digital data to the broadcaster (a *radio-on-demand provider system **411***, col. 11 lines 1-6, 12-19 and 22-44) prior to the predetermined time for broadcast of the broadcast data as specified in the broadcast schedule information (col. 16 line 40-46) so that the broadcaster can concurrently broadcast both the broadcast data and the correlated supplemental digital data to the end user at the predetermined time.

9. The following claim language is non-functional descriptive material and was not given patentable weight (MPEP § 2106.01):

"identifying when broadcast data need to be transmitted".

A "need' is not functional because it does not alter how the process steps are to be performed to achieve the utility of the invention.

10. Abecassis does not teach concurrently broadcasting both the broadcast data and the correlated supplemental digital data at the predetermined time as part of an in-band, on-channel transmission (IBOC transmission). Schumacher, Jr., et al. teaches concurrently broadcasting both the broadcast data and the correlated supplemental digital data at the predetermined time as part of an IBOC transmission (col. 1 lines 23-25). Under *KSR v. Teleflex* (82 USPQ 2nd 1385), the combination would be obvious because prior art elements are being combined according to known methods to yield predictable results. Abecassis teaches every feature of the claims except IBOC transmission. Schumacher, Jr., et al. teaches IBOC transmission.

11. Abecassis also teaches at the citations given above claims 214-217 and 220. Abecassis also teaches claim 218 (at the end of the Abstract).

12. Abecassis also separately teaches (claim 219) multiple and multimedia presentations that can be simultaneously broadcast col. 5 lines 25-34 and 56-58). It is noted that the instant application also does not literally disclose "multiple multimedia" presentations that can be simultaneously broadcast.

13. Claims 221-228 are rejected under 35 U.S.C. 103(a) as being unpatentable over Abecassis (US006192340B1).

14. Abecassis teaches (independent claim 221) a method comprising:

receiving from at least one of multiple broadcasters (*a plurality of providers **411-413***, providing service by *radio **404***, col. 11 lines 1-19 and Fig. 4) broadcast schedule information (*Providing a broadcast schedule*, col. 16 lines 40-46) identifying when broadcast data is to be transmitted over specific broadcast channels at predetermined times (a "broadcast schedule" inherently identifies "broadcast information to be transmitted over specific channels at predetermined times") from the at least one of multiple broadcasters to an end

user (*a plurality of providers **411-413***, providing service by *radio **404***, col. 11 lines 1-19 and Fig. 4);

analyzing the received broadcast schedule information (applying the *schedule/ scheduling*, *music* and *information preferences*, col. 17 lines 37-42 and col. 20 lines 23-52) and, based upon the analysis, identifying supplemental digital data (*information **755***, col. 20 lines 59-61 and Fig. 7) to be provided to a broadcaster from among the at least one of the multiple broadcasters, the supplemental digital data being correlated (*coordinated*, col. 21 lies 63-67) to broadcast data such that both can concurrently be provided by the broadcaster; and

providing the supplemental digital data to the broadcaster (a *radio-on-demand provider system **411***, col. 11 lines 1-6, 12-19 and 22-44) the predetermined time for broadcast of the broadcast data as specified in the broadcast schedule information (col. 16 line 40-46) so that the broadcaster can concurrently broadcast both the broadcast data and the correlated supplemental digital data to the end user at the predetermined time.

15. The following claim language is non-functional descriptive material and was not given patentable weight (MPEP § 2106.01):

"identifying when broadcast data need to be transmitted".

A "need' is not functional because it does not alter how the process steps are to be performed to achieve the utility of the invention.

16. Abecassis does not teach concurrently broadcasting both the broadcast data and the correlated supplemental digital data at the predetermined time as part of a digital information waveform encapsulated in a series of RF sub-carriers. Because it would improve efficiency, it would have been obvious to one of ordinary skill in the art, at the time of the invention, to add concurrently broadcasting as part of a digital information waveform encapsulated in a series of RF sub-carriers to the teachings of Abecassis.

17. Abecassis also teaches at the citations given above claims 222-225 and 228. Abecassis also teaches claim 226 (at the end of the Abstract).

18. Abecassis also separately teaches (claim 227) multiple and multimedia presentations that can be simultaneously broadcast col. 5 lines 25-34 and 56-58). It is noted that the instant

application also does not literally disclose "multiple multimedia" presentations that can be simultaneously broadcast.

Response to Arguments

19. Applicant's arguments filed with an amendment on 18 January 2009 have been fully considered but they are not persuasive. Applicant argues (pp. 6-8) that, "a digital information waveform encapsulated in a series of RF sub-carriers", is not new matter. (See the rejection under 35 USC 112, repeated as para. 2-3 above.) First, it is noted that applicant's four lines of argument in the middle of p. 6, beginning with "In-band on-channel" and ending three lines later with "frequency issues", is not clearly prior art: it is a near-verbatim copy of material found in a Wikipedia article by the examiner on 14 February 2009. See the highlighted seven lines in the Wikipedia article "In-band on-channel" made of record herein.

20. In any event, the arguments are not compelling. Applicant is correct that support need not be verbatim, but the applicant has failed to show support for the substance of the new language. For example, the new language is claiming a waveform in a series of sub-carriers. A "waveform" is a wave shape over time (NYTimes reference dictionary). Applicant is claiming that some one wave shape appears in a series of sub-carriers. There is no support for this in the specification as filed.

21. Support for the new amendment: Applicant states (p. 8 bottom) that support for "identifying when broadcast data need to be transmitted" is in para. [0009] and [0010] of the published application. No such support was found for this "need" in either of the cited paragraphs or elsewhere in the specification as filed.

22. Applicant argues, "The radio-on-demand provider system of Abecassis is (A) NOT configured to provide any schedule information to anyone and is (B) NOT configured to receive any schedule information from broadcasters." (Emphasis added.) That is not correct. As to applicant's point "A", there is no claim limitation to "provide ... schedule information". However, Abecassis does teach teaches "Providing a broadcast schedule" (col. 16, line 40), which reads on the claimed "broadcast schedule information".

23. As to applicant's point "B", Abecassis teaches providing a schedule/broadcast schedule information to a *Multimedia Player* (col. 16 lines 31-40), which literally reads on said a

Multimedia Player receiving said schedule/broadcast schedule information. *Multimedia Player* is the reference term for both a transmitter and receiver, for the reference, in one embodiment, teaches,

> *"Participants in the network **400**, however, whether classified as providers **411-413** or end user **431-438** are both providers and end users of audio, video, and information services. Analogous to a communications network, each participant is able to retrieve and transmit audio and information from any other participant".* (Abecassis, col. 11 lines 3-8, emphasis added)

The schedule/broadcast schedule information is being provided to enable satisfying a user's preferences (col. 16 lines 40-43). This is a function of a *provider*/broadcaster, so the broadcast schedule/broadcast schedule information is being provided to a *provider ... of audio, video, and information services* (col. 11 lines 3-6). From whom is said broadcast schedule/broadcast schedule information being received? Necessarily, either directly or indirectly, from another *provider*/broadcaster, because said other *provider*/broadcaster created the schedule. Hence, as noted in para. 8 of the rejection, Abecassis does teach "receiving from at least one of multiple broadcasters broadcast schedule information".

Conclusion

24. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

24. A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

25. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Donald L Champagne whose telephone number is 571-272-6717. The

examiner can normally be reached Monday, Wednesday morning, and after Noon on Thursday and Friday. The examiner can also be contacted by e-mail at donald.champagne@uspto.gov, and *informal* fax communications (i.e., communications not to be made of record) may be sent directly to the examiner at 571-273-6717.

26. The examiner's supervisor, James W. Myhre, can be reached on 571-272-6722.

27. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

28. **AFTER FINAL PRACTICE** – Consistent with MPEP § 706.07(f) and 713.09, prosecution generally ends with the final rejection. Examiner will grant an interview after final only when applicant presents compelling evidence that "disposal or clarification for appeal may be accomplished with only nominal further consideration" (MPEP § 713.09). The burden is on applicant to demonstrate this requirement, preferably in no more than 25 words. Amendments are entered after final only when the amendments will clearly simplify issues, or put the case into condition for allowance, clearly and without additional search or more than nominal consideration.

29. Applicant may have after final arguments considered and amendments entered by filing an RCE.

30. Applicant is advised that, unless a proposed amendment is filed after final and the examiner returns an advisory action with block 3(a) checked (signifying that further search or consideration is required), an amendment filed with an RCE **COULD BE MADE FINAL IN THE FIRST ACTION** in accordance with MPEP § 706.07(b).

31. **ABANDONMENT** – If examiner cannot by telephone verify applicant's intent to continue prosecution, the application is subject to abandonment six months after mailing of the last Office action. The agent, attorney or applicant point of contact is responsible for assuring that the Office has their telephone number. Agents and attorneys may verify their

registration information including telephone number at the Office's web site, www.uspto.gov. At the top of the home page, click on Site Index. Then click on Agent & Attorney Roster in the alphabetic list, and search for your registration by your name or number.

14 February 2009

/Donald L. Champagne/
Primary Examiner, Art Unit 3688

Notice of References Cited	Application/Control No. 09/839,451	Applicant(s)/Patent Under Reexamination CORTS ET AL.	
	Examiner Donald L. Champagne	Art Unit 3688	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
	A	US-			
	B	US-			
	C	US-			
	D	US-			
	E	US-			
	F	US-			
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	H	US-			
	I	US-			
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	K	US-			
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	M	US-			

FOREIGN PATENT DOCUMENTS

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	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	"In band on channel", article downloaded 14 February 2009 from http://en.wikipedia.org/wiki/In-band_on-channel.
	V	NYTimes reference definition of "waveform", downloaded 14 February 2009 from http://query.nytimes.com/search/query?query=waveform&srchst=ref&submit.x=26&submit.y=9.
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

In-band on-channel

From Wikipedia, the free encyclopedia

However, by putting extra RF energy beyond the edge of the station's normally-defined channel, interference with adjacent channel stations is increased when using digital sidebands.

IBOC does allow for multiple program channels, though this can entail taking some existing subcarriers off the air to make additional bandwidth available in the modulation baseband. On FM, this could eventually mean removing stereo. On AM, IBOC is generally incompatible with analog

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stereo at all, and any additional channels are limited to highly-compressed voice, such as traffic and weather. Eventually, stations can go from hybrid mode (both analog and digital) to all-digital, by eliminating the baseband monophonic audio.

Contents [hide]

FM methods [edit]

On FM there are currently two methods of IBOC broadcasting in use, mainly in the United States.

HD Radio Broadcasting [edit]

The first, and currently only, digital technology approved for AM and FM broadcasting by the Federal Communications Commission in the United States, is the HD Radio system developed by iBiquity Digital Corporation, which uses sidebands beyond the normal ±100 kHz FM channel. This is the most well-known and widespread system in use: with over 1,700 stations on the air int the US, plus over 800 new multicast channes (as of June 2008), 83 percent of Americans have access to HD Radio stations. It costs FM stations approximately $50,000 to $100,000 in new equipment to broadcast with the HD Radio system. There is also a one-time license fee to iBiquity Digital for the use of its intellectual property that varies around $25,000.

FMeXtra [edit]

The other system is FMeXtra by Digital Radio Express, which instead uses subcarriers within the existing signal. This was introduced more recently, . The system is completely compatible with HD Radio in hybrid mode (but not in all-digital mode, which is not expected to be implemented for a very long time), and with RBDS. The stereo subcarrier can be removed to make more space

available for FMeXtra in the modulation baseband. However, the system is not compatible with other existing subcarriers, which are normally not used by the general public anyhow. The system is far less expensive and less complicated to implement, needing only to be plugged in to the existing exciter, and requiring no licensing fees. FMeXtra has generally all the user features of HD Radio, including multicast capability – the ability to broadcast several different audio programs simultaneously. It uses the aacPlus (HE-AAC) codec.

FMeXtra can control listening with conditional access and encryption.

DRM+ [edit]

Digital Radio Mondiale is in the initial stages of creating an open-source system for FM, though it may be too late to make a third system viable with two others already in place.

AM methods [edit]

HD Radio Broadcasting [edit]

iBiquity also created a mediumwave HD Radio system for AM, which is the only system approved by the Federal

Communications Commission for digital AM broadcasting in the United States. The HD Radio system employs use of injecting digital sidebands above and below the audible portion of the analog audio on the primary carrier. This system also phase modulates the carrier in quadrature and injects more digital information on this phase-modulated portion of the carrier. It is based on the principle of AM stereo where it puts a digital signal where the C-QUAM system would put the analog stereo decoding information.

DRM [edit]

Digital Radio Mondiale has had much more success[*citation needed*] in creating an AM system, and one that could be much less expensive to implement than any proprietary HD Radio system, although it requires new frequency. It is the only one to have been accepted mediumwave but also shortwave (and possibly longwave) by the International Telecommunication Union (ITU) for use in regions I and III, but not yet in region II, the Americas. The HD Radio system has also been approved by International Telecommunication Union.

CAM-D [edit]

The neutrality of this article is disputed.

Please see the discussion on the talk page. *(March 2008)*

Please do not remove this message until the dispute is resolved.

CAM-D is yet another method, though it is more of an extension of the current system. Developed by AM stereo pioneer Leonard Kahn, It encodes the treble on very small digital sidebands which do not cause interference to adjacent channels, and mixes it back with the analog baseband. Unlike the other two, it is not intended to be capable of multichannel, opting for quality over quantity. Unlike the HD system iBiquity calls "hybrid digital" the CAM-D system truly is a direct hybrid of both analog and digital. Some engineers believe that CAM-D may be compatible with analog AM stereo with the right engineering.

Critics of CAM-D point to several drawbacks: (a), being primarily analog, the system will be just as subject to artificial interference and noise as the current AM system; (b), there are virtually no receivers available for the system and at present, no major manufacturer has announced even the intention to begin production of them; and (c), the

cost of retrofitting with CAM-D is more than that of simply buying a new, HD-ready solid state transmitter.

IBOC Versus DAB [edit]

While the United Kingdom has chosen the Eureka 147 standard of digital audio broadcasting (DAB) for creating a digital radio service, the United States has selected IBOC technology for its digital AM and FM stations.

The band used for terrestrial DAB in the UK is VHF band III, which does not suffer from L-band's significant line-of-sight problems. However, it is not available in North America since that span is occupied by TV channels 7 to 13. The stations currently occupying that spectrum did not wish to give up their space, since VHF offers several benefits over UHF: relatively lower power, long distance propagation (up to 100 miles (160 km) with a rooftop antenna), and a longer wavelength that is more robust and less affected by interference. In Canada, the Canadian Radio-television and Telecommunications Commission (CRTC) is continuing to follow the analog standard, so the channels remain unavailable there as well. HD Radio testing has been authorized in Canada among other countries around the world.

There was also concern that AM and FM stations' branding, using their current frequencies, would be lost to new channel numbers, though virtual channels such as on digital television would eliminate this. Also, several competing stations would have to share a transmitter that multiplexes them all into one ensemble with the same coverage area (though many FM stations are already diplexed in large cities such as New York). [1] A further concern to FM stations was that AM stations could suddenly be in competition with the same high audio quality, although FM would still have the advantage of higher data rates (300 kbit/s versus 60 kbit/s in the HD Radio standard) due to greater bandwidth (100 kHz versus 10 kHz).

The most significant advantage to IBOC is its relative ease of implementation. Existing analog radios are not rendered obsolete and the consumer and industry may transition to digital at a rational pace. In addition, the technology infrastructure is in place: most major broadcast equipment manufacturers are implementing IBOC technology and 60+ receiver manufacturers are selling IBOC reception devices.

Challenges [edit]

AM IBOC in the United States still faces some serious technological challenges of its own, including nighttime interference with other stations. iBiquity was previously using PAC (also used at a higher bitrate in Sirius satellite radio [see Digital Audio Radio Service]), but in August 2003 a switch to HDC (based-upon ACC) was made to rectify these problems. HDC has been customized for IBOC, and it is also likely that the patent rights and royalties for every transmitter and receiver can be retained longer by creating a more proprietary system. Digital Radio Mondiale is also developing an IBOC system, likely to be used worldwide with AM shortwave radio, and possibly with broadcast AM and FM. Neither of those have been approved yet for ITU region 2 (the Americas). The system, however, unlike HD Radio, does not permit the existing analog signal and the digital signal to live together in the same channel. DRM requires an additional channel to maintain both signals.

Both AM and FM IBOC signals cause interference to adjacent-channel stations, but not within the station's FCC-designated interference-free protected contours. It has led to derogatory terms such as IBAC (In-band adjacent-

channel) and IBUZ (since the interference sounds like a buzz.) The range of a station on an HD Radio receiver is somewhat less than its analog signal. However, in June, 2008, a group of US broadcasters and equipment manufacturers requested that the U.S. Federal Communications Commission (FCC) increase the permissible FM IBOC power from 1% (currently) to a maximum of 10% of the analog power. In addition, tropospheric ducting and e-skip can reduce the range of the digital signal, as well as the analog.

In-band on-channel digital radios using iBiquity's standard are being marketed under the brand "HD Radio" to highlight the purported quality of reception. As of June 2008, over 60 different receiver models have been made, and stations have received blanket (no longer individual and experimental) authorization from the U.S. Federal Communications Commission (FCC) to transmit in a multiplexed multichannel mode on FM. Originally, the use of HD Radio transmission on AM was limited to daytime only, and not allowed at night due to potential problems with skywave radio propagation. The FCC lifted this restriction in early 2007. DRM, however, is being used across Europe on shortwave, which is entirely AM

skywave, without issue. With the proper receiver, many of those stations can be heard in North America as well, sans the analog signal.

IBOC around the world [edit]

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Argentina [edit]

HD Radio technology was tested in 2004 with initial trials in Buenos Aires. Further testing of the technology began in early 2007.

Bosnia [edit]

Trial and tests of HD Radio technology began in Sarajevo in March 2007.

Brazil [edit]

HD Radio transmission in Brazil was started on September 26, 2005. The radio stations that use IBOC HD in Brazil are

Radio Bandeirantes, Radio Globo, and RBS Group. A total of six stations – one FM and one AM from each group – are now transmitting in HD Radio. KISS FM in São Paulo is the first HD Radio station in Brazil. A total of 24 stations are broadcasting in Brazil as of June, 2008. A joint study by the government (ANATEL) and broadcasters' associations (ABERT, AESP) is completed and awaiting government action to regulate HD Radio broadcasting in Brazil.

Canada [edit]

After having L-band DAB for several years, the Canadian Radio-Television and Telecommunications Commission (CRTC) and Canadian Broadcasting Corporation {CBC) have also looked at the use of HD Radio, given its gradual progress in the neighbouring U.S. The CBC began HD Radio testing in September 2006, focusing on transmissions from Toronto and Peterborough, Ontario. The CRTC has since revised its policy on digital radio to allow HD Radio operations pursuant to Public Notice CRTC 2006-160.

Czech Republic [edit]

Initial testing of the HD Radio system commenced in

Prague in February 2007.

China [edit]

In China, Hunan Broadcasting Company started FMeXtra transmissions in Changsha in April 2007, and plans to put others throughout the Hunan province. [1] SARFT (State Administration for Radio, Film and Television) is currently testing HD Radio in Beijing in contemplation for acceptance in that country.

Colombia [edit]

Caracol Radio began testing of the HD Radio technology in both the AM and FM bands in early 2008.

Europe [edit]

In September 2007 the European HD Radio Alliance (EHDRA) was formed by broadcasters and other interested groups to promote the adoption of HD Radio technology by European broadcasters, regulators and standards organizations.

France [edit]

France began broadcasting an HD Radio signal in March 2006 and plans to multicast two or more channels. The

radio stations that use IBOC HD in France are SIRTI and NRJ Group. The owner of the transmitter is Towercast. The frequency of IBOC HD radio is 88.2 MHz. In May 2006, The Towercast group added a single channel of digital audio on 93.9 MHz.

Germany [edit]

Radio Regenbogen began HD Radio operations on 102.8 MHz in Heidelberg on December 3, 2007 pursuant to government testing authority.

Indonesia [edit]

Forum Radio Jaringan Indonesia had tested IBOC HD transmission from March 2006 to May 2006. The IBOC HD station in Jakarta was Delta FM (99.1 MHz). In April 2006, Radio Sangkakala (in Surabaya), the first AM HD radio station in Asia, went on the air on 1062 kHz.

Jamaica [edit]

Radio Jamaica began operating full time with both HD Radio AM and FM signals in the city of Kingston in 2008.

Mexico [edit]

All Mexican radio stations within 320 km of the U.S. border

are allowed to transmit their programs on the AM and FM bands utilizing HD Radio technology. Approximately six Mexican AM and FM stations are already operating with HD Radio technology along Mexico's border area with the US. Groupo Imagen commenced HD Radio transmissions on XHDL and XEDA in Mexico City in June 2008.

New Zealand [edit]

HD Radio transmission in Auckland, New Zealand was started on October 19, 2005. The frequency of IBOC HD radio is 106.1 MHz. The transmitter is located at Skytower. Following successful testing, the Radio Broadcasters Association (RBA) initiated a comprehensive trial of HD Radio technology in December 2006. The aim of the trial was to assess the coverage potential of the HD Radio system and to make a recommendation on the suitability of the technology for adoption.

Philippines [edit]

The first HD Radio station in the Philippines began broadcasting on November 9, 2005. The Philippines National Telecommunications Commission finalized its rules for FM digital radio operations on November 11, 2007.

Poland [edit]

An HD Radio trial began in Warsaw in 2006 in order to demonstrate the technology to local radio stations.

Puerto Rico [edit]

WPRM FM is the first station in San Juan, Puerto Rico (part of the US) to adopt HD Radio, in April 2005. WRTU in San Juan has also commenced broadcasting in HD Radio technology in 2007.

Switzerland [edit]

FM testing sponsored by Radio Sunshine and Ruoss AG began in Lucerne in April 2006. HD Radio operations in Switzerland continue and are spotlighted each year during "HD Radio Days", an annual gathering in Lucerne of European broadcasters and manufacturers for the purpose of discussing the rollout of the technology in Europe.

Thailand [edit]

HD Radio transmission in Thailand was started in April 2006. Radio of Thailand had created a public IBOC HD radio network targeting mass transit commuters in Thailand's capital of Bangkok. To receive the broadcasts,

more than 10,000 HD Radio receivers were installed in buses.

Ukraine [edit]

The first FM HD Radio broadcasts in Kiev went on the air in October 2006 on two FM stations operated by the First Ukrainian Radio Group.

Vietnam [edit]

Voice of Vietnam (VOV) commenced AM and FM HD Radio transmissions in Hanoi in June, 2008 including multicasting, in anticipation of making HD Radio technology a standard.

United States [edit]

As of June 2008, more than 1,700 HD Radio stations were broadcasting 2,432 HD Radio channels. HD Radio technology is the only digital technology approved by the FCC for digital AM and FM broadcsting in the US. Over 60 different HD Radio receivers are on sale in over 12,000 stores nationwide, including Apple, Circuit City, Best Buy, Target, and Wal-Mart.

As of May 2007, FMeXtra is on several dozen stations. Several hundred stations belonging to the Idea Bank consortium will also have FMeXtra installed. [2]

See also [edit]

- Digital Audio Broadcasting
- Digital Audio Radio Service
- IBAC
- ISDB

External links [edit]

- FCC info on IBOC
- NSRC-5A IBOC Standard Specification
- Stop IBOC Now!
- IBOC interference recordings

Category: Radio terminology

waveform

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Dictionary

wave·form (wāv'fôrm')
n.

The mathematical representation of a wave, especially a graph obtained by plotting a characteristic of the wave against time.

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